

AMENDMENTS TO THE CLAIMS

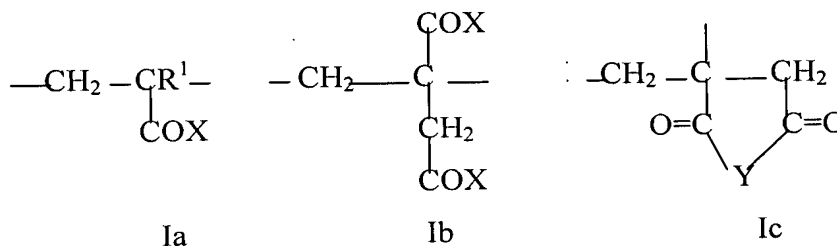
This listing of claims will replace all prior versions and listings of claims in the application:

Cancel claims 1-18.

19. (New) A method of imparting flow to a cementitious composition, comprising the addition thereto of an admixture comprising:

- (1) 2-phosphonobutane-1,2,4-tricarboxylic acid;
- (2) optionally, citric acid or citric acid monohydrate; and
- (3) at least one polymer derived from ethylenically-unsaturated mono-or dicarboxylic acids, and characterised in that the polymer comprises:

a) 51-95 mole % of moieties of formula 1a and/or 1b and/or 1c



wherein R^1 = hydrogen or a C_{1-20} aliphatic hydrocarbon residue;

$X = O_a M$, $-\text{O}-(C_m H_{2m} O)_n - R^2$, $-\text{NH}-(C_m H_{2m} O)_n - R^2$,

M = hydrogen, a mono-or divalent metal cation, an ammonium ion or an organic amine residue;

$a = 0.5$ or 1 ;

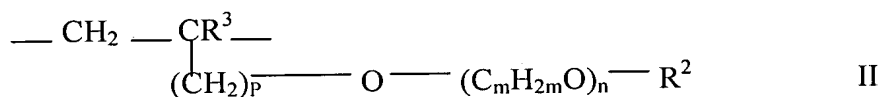
R^2 = hydrogen, C_{1-20} aliphatic hydrocarbon, C_{5-8} cycloaliphatic hydrocarbon or optionally substituted C_{6-14} aryl residue;

$Y = O$, NR^2 ;

$m = 2-4$; and

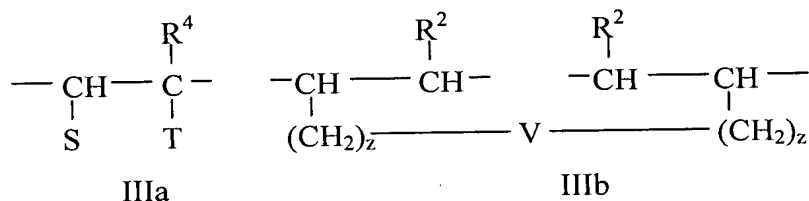
$n = 0-200$;

- b) 1-48.9 mole% of moieties of the general formula II

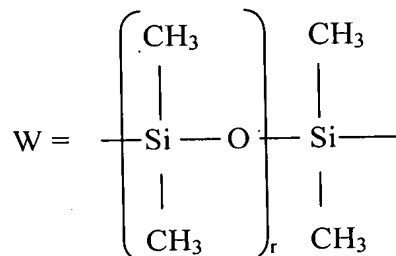


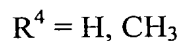
wherein R^3 = hydrogen or C_{1-5} aliphatic hydrocarbon;
 $p = 0-3$; and
 R^2 has the meaning given previously;

- c) 0.1-5 mole % of moieties of Formulae IIIa or IIIb

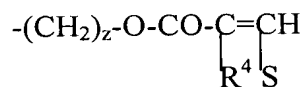
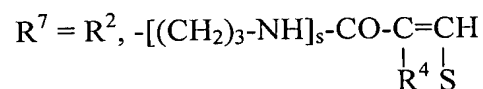
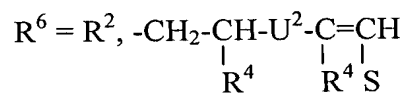


wherein $\text{S} = \text{H}, -\text{COO}_a\text{M}, -\text{COOR}^5$
 $\text{T} = \text{U}^1\text{---}\underset{\text{CH}^3}{\text{CH}}\text{---CH}_2\text{---O)}_x\text{---(CH}_2\text{---CH}_2\text{O)}_y\text{R}^6$
 $-\text{W-R}^7$
 $-\text{CO-[NH-(CH}_2\text{)}_3\text{]}_s\text{---W-R}^7$
 $-\text{CO-O-(CH}_2\text{)}_z\text{---W-R}^7$
 $-(\text{CH}_2\text{)}_z\text{---V---(CH}_2\text{)}_z\text{---CH=CH-R}^2$
 $-\text{COOR}^5$ when S is $-\text{COOR}^5$ or COO_aM
 $\text{U}^1 = -\text{CO-NH-}, -\text{O-}, -\text{CH}_2\text{O-}$
 $\text{U}^2 = -\text{NH-CO-}, -\text{O-}, -\text{OCH}_2\text{-}$
 $\text{V} = -\text{O-CO-C}_6\text{H}_4\text{-CO-O-}$ or $-\text{W-}$





R^5 = a C_{3-20} aliphatic hydrocarbon residue, a C_5-C_8 cycloaliphatic hydrocarbon residue or a C_{6-14} aryl residue;



wherein

$$r = 2-100$$

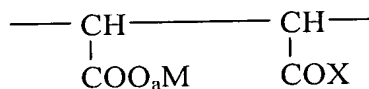
$$s = 1, 2$$

$$z = 0-4$$

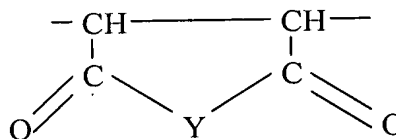
$$x = 1-150$$

$$y = 0-15; \text{ and}$$

d) 0-47.9 mole % of moieties of the general formula IVa and / or IV b:



IVa



IVb

wherein a, M, X and Y have the meanings defined above.

20. (New) The method according to claim 19, in which:

a) the moiety is according to formula Ia;

R^1, R^2 are independently H or CH_3 ;

$X = O_a M, -O-(C_m H_{2m} O)_n - R^2$

$M = H$ or a mono-or divalent metal cation;

$a = 1$;

$Y = O, NR^2$;

$m = 2-3$; and

$n = 20-150$;

b) R^2, R^3 are independently H or CH_3 ; and

$p = 0-1$; and

c) the moiety is according to formula IIIa;

$S = H, -COO_a M, -COOR^5$

$T = U^1 - (\underset{\underset{CH^3}{|}}{CH-CH_2-O})_x - (CH_2-CH_2O)_y R^6$

$-CO-[NH-(CH_2)_3]_s - W - R^7$

$-CO-O-(CH_2)_z - W - R^7$

R^4, R^5 are independently H, CH_3 ;

$R^6 = R^2, -CH_2-\underset{\underset{R^4}{|}}{CH}-U^2-\underset{\underset{R^4}{|}}{C}=\underset{\underset{S}{|}}{CH}$

$R^7 = R^2, -[(CH_2)_3-NH]_s - CO-\underset{\underset{R^4}{|}}{C}=\underset{\underset{S}{|}}{CH}$

$-(CH_2)_z - O - CO - \underset{\underset{R^4}{|}}{C}=\underset{\underset{S}{|}}{CH}$

wherein

$U^1 = -CO-NH-, -O-, -CH_2O-$

$U^2 = -NH-CO-, -O-, -OCH_2-$

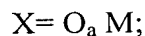
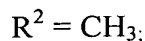
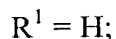
$x = 20-50$;

$y = 1-10$; and

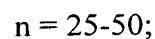
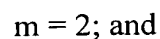
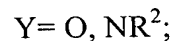
$z = 0-2$.

21. (New) The method according to claim 20, in which:

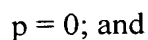
a) the moiety is according to formula Ia;



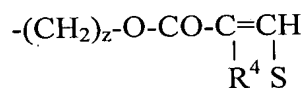
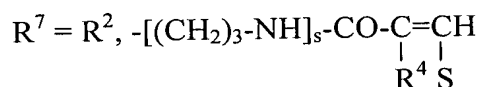
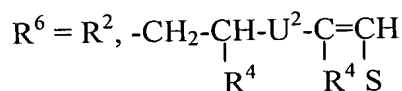
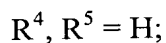
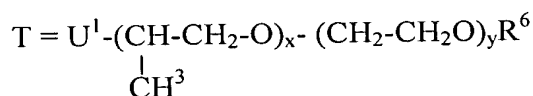
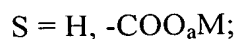
M = a mono-or divalent metal cation;



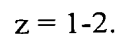
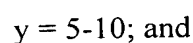
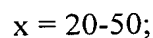
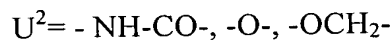
b) $R^2, R^3 = H;$ and



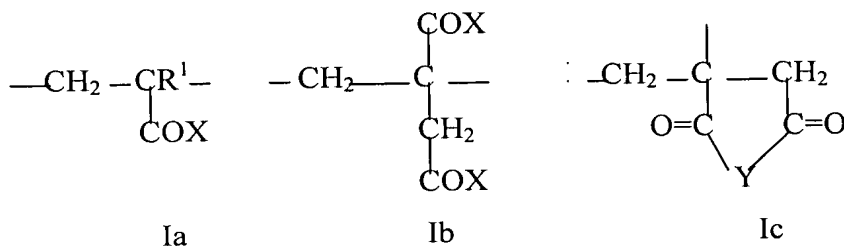
c) the moiety is according to formula IIIa;



wherein



22. (New) The method of claim 19 wherein the polymer has a weight-average molecular weight of from about 5,000 to about 50,000.
23. (New) The method of claim 19 wherein the polymer has a weight-average molecular weight of from about 10,000 to about 40,000.
24. (New) The admixture of claim 19 wherein the proportions of the solids of the three components are:
Component 1 - about 1% to about 40%;
Component 2 - 0 to about 40%; and
Component 3 - about 5% to about 60%.
25. (New) The method of claim 19 wherein the admixture is added at a rate of from about 0.2% to about 2% by weight solids of cement.
26. (New) A method of spraying a cementitious composition comprising preparing a cementitious mix and conveying the mix to a spray nozzle, there being added to the mix at preparation an admixture comprising:
 - (1) 2-phosphonobutane-1,2,4-tricarboxylic acid;
 - (2) optionally, citric acid or citric acid monohydrate; and
 - (3) at least one polymer derived from ethylenically-unsaturated mono- or dicarboxylic acids, and characterised in that the polymer comprises:
 - a) 51-95 mole % of moieties of formula 1a and/or 1b and/or 1c



wherein R^1 = hydrogen or a C_{1-20} aliphatic hydrocarbon residue;
 $X = O_a M, -O-(C_m H_{2m} O)_n - R^2, -NH-(C_m H_{2m} O)_n - R^2,$

M = hydrogen, a mono-or divalent metal cation, an ammonium ion or an organic amine residue;

a=0.5 or 1;

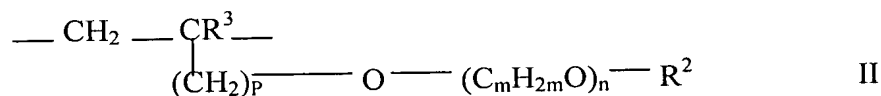
R² = hydrogen, C₁₋₂₀ aliphatic hydrocarbon, C₅₋₈ cycloaliphatic hydrocarbon or optionally substituted C₆₋₁₄ aryl residue;

Y= O, NR²;

m= 2-4; and

n= 0-200;

b) 1-48.9 mole% of moieties of the general formula II

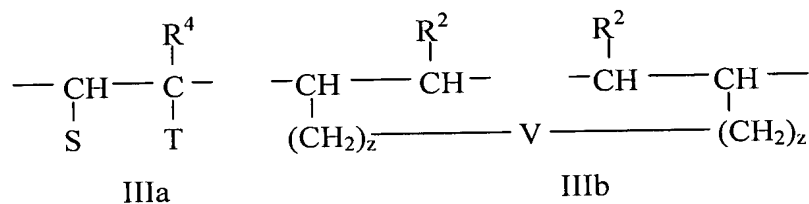


wherein R³ = hydrogen or C₁₋₅ aliphatic hydrocarbon;

p = 0-3; and

R² has the meaning given previously;

c) 0.1-5 mole % of moieties of Formulae IIIa or IIIb



wherein S = H, -COO_aM, -COOR⁵

T = U¹-(CH-CH₂-O)_x-(CH₂-CH₂O)_yR⁶
 $\underset{\text{CH}^3}{\text{C}}$

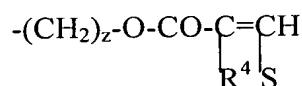
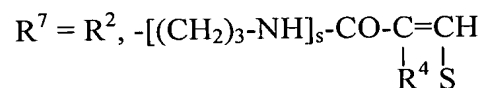
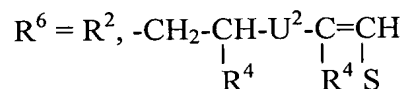
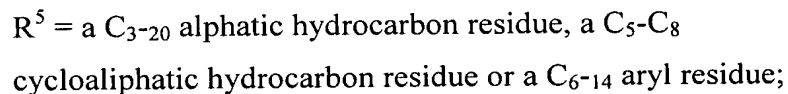
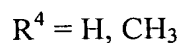
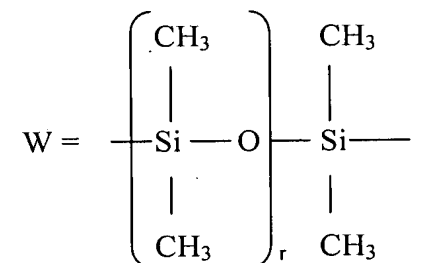
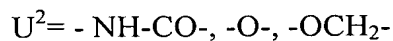
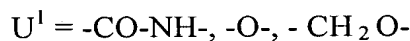
-W-R⁷

-CO-[NH-(CH₂)₃]_s-W-R⁷

-CO-O-(CH₂)_z-W-R⁷

-(CH₂)_z-V-(CH₂)_z-CH=CH-R²

-COOR⁵ when S is -COOR⁵ or COO_aM



wherein

$$r = 2-100$$

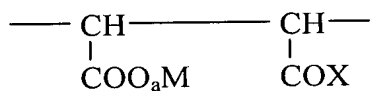
$$s = 1, 2$$

$$z = 0-4$$

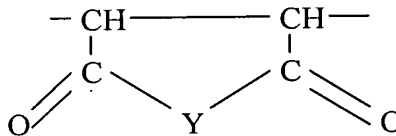
$$x = 1-150$$

$$y = 0-15; \text{ and}$$

d) 0-47.9 mole % of moieties of the general formula IVa and / or IV b:



IVa



IVb

wherein a, M, X and Y have the meanings defined above.

27. (New) The method according to claim 26, in which:

a) the moiety is according to formula Ia;

R^1, R^2 are independently H or CH_3 ;

$X = O_a M, -O-(C_m H_{2m} O)_n - R^2$

$M = H$ or a mono-or divalent metal cation;

$a = 1$;

$Y = O, NR^2$;

$m = 2-3$; and

$n = 20-150$;

b) R^2, R^3 are independently H or CH_3 ; and

$p = 0-1$; and

c) the moiety is according to formula IIIa;

$S = H, -COO_a M, -COOR^5$

$T = U^1 - \underset{\underset{CH^3}{|}}{(CH-CH_2-O)}_x - (CH_2-CH_2O)_y R^6$

$-CO-[NH-(CH_2)_3]_s - W - R^7$

$-CO-O-(CH_2)_z - W - R^7$

R^4, R^5 are independently H, CH_3 ;

$R^6 = R^2, -CH_2 - \underset{\underset{R^4}{|}}{CH} - U^2 - \underset{\underset{R^4}{|}}{C} = \underset{\underset{S}{|}}{CH}$

$R^7 = R^2, -[(CH_2)_3 - NH]_s - CO - \underset{\underset{R^4}{|}}{C} = \underset{\underset{S}{|}}{CH}$

$-(CH_2)_z - O - CO - \underset{\underset{R^4}{|}}{C} = \underset{\underset{S}{|}}{CH}$

wherein

$U^1 = -CO-NH-, -O-, -CH_2 O-$

$U^2 = -NH-CO-, -O-, -OCH_2-$

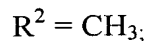
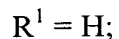
$x = 20-50$;

$y = 1-10$; and

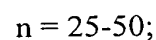
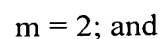
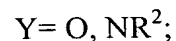
$z = 0-2$.

28. (New) The method according to claim 27, in which:

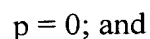
a) the moiety is according to formula Ia;



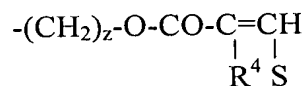
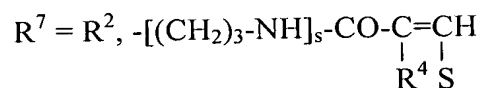
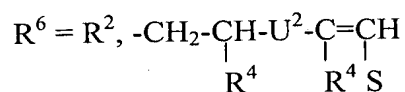
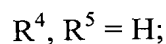
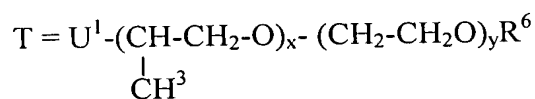
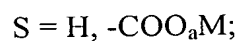
M = a mono-or divalent metal cation;



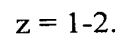
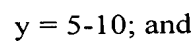
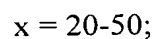
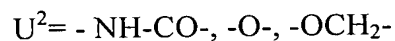
b) $R^2, R^3 = H;$ and



c) the moiety is according to formula IIIa;



wherein



29. (New) The method of claim 26 wherein the polymer has a weight-average molecular weight of from about 5,000 to about 50,000.
30. (New) The method of claim 26 wherein the polymer has a weight-average molecular weight of from about 10,000 to about 40,000.
31. (New) The admixture of claim 26 wherein the proportions of the solids of the three components are:
Component 1 - about 1% to about 40%;
Component 2 – 0 to about 40%; and
Component 3 – about 5% to about 60%.
32. (New) The method of claim 26 wherein the admixture is added at a rate of from about 0.2% to about 2% by weight solids of cement.